Mind the gap

Bouma, J. A.; Koetse, M. J.

published in
Land Economics
2019

DOI (link to publisher)
10.3368/LE.95.2.225

document version
Publisher's PDF, also known as Version of record

Mind the Gap: Stated versus Revealed Donations and the Differential Role of Behavioral Factors

J. A. Bouma, M. J. Koetse

Land Economics, Volume 95, Number 2, May 2019, pp. 225-245 (Article)

Published by University of Wisconsin Press

Mind the Gap: Stated versus Revealed Donations and the Differential Role of Behavioral Factors

J. A. Bouma *Senior researcher, PBL Netherlands Environmental Assessment Agency, The Hague, The Netherlands; and Institute for Environmental Studies (IVM), Vrije Universiteit Amsterdam, Amsterdam, Netherlands, jetske.bouma@pbl.nl*

M. J. Koetse *Assistant professor, Institute for Environmental Studies (IVM), Vrije Universiteit Amsterdam, Amsterdam, Netherlands, mark.koetse@pbl.nl*

ABSTRACT *This paper uses a contingent valuation study and an actual donation request to assess the impact of behavioral factors on hypothetical bias in stated willingness-to-pay estimates. Our findings indicate that both the number of respondents willing to donate and the amount they are willing to donate differ substantially between treatments. Behavioral factors play a substantial and significant role; in particular, the extent of warm glow derived from giving and expectations about other people's behavior increase the extent of hypothetical bias in stated willingness-to-pay estimates. We suggest ways in which this may be incorporated in future contingent valuation study design.* (JEL Q51)

1. Introduction

Assessing people's willingness to pay for the provisioning of environmental goods and services is notoriously difficult; most environmental goods and services have no market value as markets are missing, and because of the lack of institutions that link supply of and demand for environmental services, the latent demand for environmental services remains unclear (Turner, Pearce, and Bateman 1994). Environmental valuation methods have been developed to assess the demand for environmental goods and services, but they struggle with problems of hypothetical bias. Since Diamond and Hausman's study (1994) a number of researchers have addressed the question of which factors increase or decrease the hypothetical bias of contingent valuation (CV) studies (List and Gallet 2001; Murphy et al. 2005; Loomis 2011; Brown, Ajzen, and Hrubes 2003; Champ and Bishop 2001). The focus has been on the lack of incentive compatibility and consequentialism in stated survey methods (Kling, Phaneuf, and Zhao 2012; Vossler, Doyon, and Rondeau 2012) and the need for sound survey design (Arrow et al. 1993; Carson 2012; Loomis 2011).

Recently, a number of studies have revisited the NOAA guidelines for stated preference studies (Arrow et al. 1993), arguing that the consequentialism of stated preference studies can be improved by using a binding payment vehicle, like a tax mechanism, with a binary contribution option and by paying explicit attention to the credibility of the valuation question and the information provided in the stated preference survey (Bishop et al. 2017; Johnston et al. 2017). Increasingly, tax mechanisms are not a credible payment vehicle for financing environmental good provisioning, however, as governments around the globe are devolving natural resource management to the private sector and to nongovernmental organizations and citizen groups (Cashore 2002; Kettl 2000). Also, even when a binding payment vehicle can be credibly envisioned, proposing a binary contribution choice may not be realistic (Bateman et al. 2008). Under such circumstances, the design of stated preference studies also has to account for the public good dimension of environmental good provisioning (Carson, Groves, and List 2014; Kotchen 2015), something to which the literature on stated preference methods has paid little attention so far (Kling, Phaneuf, and Zhao 2012; Harrison and Rütstrom 2008).

The public good dimension of voluntary environmental good provisioning gives rise

Land Economics • May 2019 • 95 (2): 225–245
ISSN 0023-7639; E-ISSN 1543-8325

Appendix materials are freely available at http://le.uwpress.org and via the links in the electronic version of this article.

to a number of behavioral factors, like social preferences and expectations (Frey and Meier 2004; Andreoni 1990) that in the environmental valuation literature have been discussed only to a limited extent. Behavioral factors that have received attention in the economic valuation literature include environmental attitudes and revealed proenvironmental behavior (Kotchen and Reiling 2000; Spash 2006, 2008; Cooper, Poe, and Bateman 2004). Both types of behavioral factors will be included in this paper's analysis.

In order to capture hypothetical bias, we create three versions of a stated preference survey. The first version is a classical CV survey and the second version includes a cheap talk script (Cummings and Taylor 1999). The third version presents respondents with an actual donation request. Few studies have compared hypothetical and real treatments, and the studies that do often endow subjects with donation money. Exceptions are studies by Seip and Strand (1992) who compare hypothetical and actual willingness to become member of an environmental group, Brown et al. (1996) who compare hypothetical and actual contributions to road removal in Grand Canyon National Park, Champ and Bishop (2001) and Poe et al. (2002) who compare hypothetical and actual willingness to join a green electricity program, and Moser et al. (2014) who compare hypothetical and actual green consumption decisions in a supermarket. None of these studies assesses the role of behavioral factors in explaining hypothetical bias and individual willingness to donate, however, although Brown, Ajzen, and Hrubes (2006) suggest that social preferences may play a role in explaining hypothetical behavior and Champ and Bishop (2001) indicate that uncertainty (about other people's behavior?) may explain the gap. Our study is to our knowledge the first that explicitly assesses the role of behavioral factors in explaining hypothetical bias and donation behavior. We focus our analysis on social preferences and expectations, social expectations functioning both as an anchor in case of bounded rationality (Abeler et al. 2011) and as norm for conditional cooperators (Fischbacher and Gächter 2010).

The aim of our study is twofold: First, we want to contribute to the improvement of stated preference methods in settings where there is no credible binding payment vehicle. In such settings, behavioral factors are likely to influence people's willingness to donate. By understanding the influence of behavioral factors on the stated preference estimates, we may control for them in assessing people's willingness to pay. Second, we want to understand the extent to which individuals are willing to voluntarily donate to public good provisioning. This is especially relevant for policy makers and practitioners in a growing number of environmental domains where traditional ways of governmental conservation are abandoned, thereby creating room for private initiatives and comanagement arrangements.

Our findings indicate that both the number of respondents that are willing to donate and the amount they are willing to donate differ significantly between treatments. We find that the hypothetical willingness to donate is 3.5 times higher than the willingness to donate derived from the actual donation request. This is comparable with the factor of 3 difference that List and Gallet (2001) and Murphy et al. (2005) find. Income and education significantly increase the extent of hypothetical bias (more educated and richer respondents overstating their willingness to donate more), and higher expectations of other people's donations and warm glow feelings increase the extent of hypothetical bias too. Interestingly, we find that in the decision to actually transfer money, social preferences (warm glow) no longer play a significant role. In fact, social expectations now have the opposite sign: respondents that expect that few others will donate are the ones that actually transfer the stated amount.

2. Donation Behavior and Behavioral Factors Affecting Willingness to Pay

"Behavioral factors" is a rather broad term. It relates to the uncertainty and complexity of the task of valuing environmental goods and services (List 2001; Bateman et al. 2008; Schläpfer and Fischhoff 2012) and to the factors determining why certain people are more likely to contribute to causes in the environmental domain (Kotchen and Reiling

2000). In addition, the public good dimension of environmental goods and services gives rise to a number of behavioral issues. Standard economic theory predicts that individual actors have little incentive to voluntarily contribute to the provisioning of semipublic goods because of free-riding, namely, the notion that noncontributing actors also benefit from the public good (Samuelson 1954). Real-life examples and behavior in economic experiments suggest that individual actors do voluntarily contribute, either because they derive utility from the act of giving—due to social preferences (Andreoni 1990) or a desire to conform (Bernheim 1994)—or because free-rider behavior can be mitigated through shared expectations and norms (Fischbacher and Gächter 2010; Frey and Meier 2004). This paper focuses on the behavioral factors related to voluntary contributions to semipublic good provisioning. In addition, we account for a number of factors that have been shown to affect willingness to pay estimates, like income and scarcity (e.g., Brander and Koetse 2011), distance decay (e.g., Bateman et al. 2006; Hanley, Schläpfer, and Spurgeon 2003), bounded rationality and reference dependence (e.g., Koetse and Brouwer 2016; Hausman 2012), and noneconomic motives and attitudes regarding the donation request (Kotchen and Reiling 2000; Spash 2006, 2008; Cooper, Poe, and Bateman 2004). Below, we briefly discuss the different factors and their expected impact on hypothetical bias.

Revealed Proenvironmental Behavior

Considering the factors explaining donation behavior, De Oliveira, Croson, and Eckel (2011) demonstrate that people who already donate to social causes are more likely to donate to additional causes as well. The underlying reason here may be what Baron (2010) coins as the capacity to self-regulate and forego private benefits for the sake of social welfare. In our analysis we account for revealed proenvironmental behavior, expecting that subjects who already donate to nature conservation and consume ecologically certified products are more likely to donate to agrienvironmental conservation as well. With regard to the impact on hypothetical bias we expect proenvironmental behavior to reduce hypothetical bias. We expect this as respondents that have a propensity to donate to social causes are likely to have a capacity to self-regulate and thus are less likely to overstate their contributions.

Proenvironmental Attitude

Schkade and Payne (1994) and Kotchen and Reiling (2000) show that having a proenvironmental attitude increases the likelihood that a subject is willing to pay. Milfont and Duckitt (2010) review the psychological literature on environmental attitudes, finding that important factors are the subject's preferences and concern for nature (enjoyment, sense of urgency, perceived vulnerability) and perceived adequacy of conservation policy and role of the government. Kotchen and Reiling (2000) analyze whether and how environmental attitudes influence stated willingness to pay. They indicate that proenvironmental attitudes do not only increase donations, but also reduce the number of protest votes and illegitimate answers; hence, environmental attitudes may have an impact on hypothetical bias too. Therefore, we expect a proenvironmental attitude to increase the willingness to pay, and to reduce hypothetical bias.

Perceived Legitimacy of the Donation Request

We consider the perceived adequacy and role of the government (Milfont and Duckitt 2010) separately, as government involvement may both crowd in or crowd out voluntary contributions to public goods (Frey and Oberholtzer-Gee 1997; Rode, Gómez-Baggethun, and Krause 2015). For example, Nyborg and Rege (2003) indicate that in a setting where resource management is voluntary, public policy may crowd out intrinsic motivations. In our case, the institutional context is that of a retreating government. Tyler (2006) indicates that under such conditions the likelihood of subjects making voluntary contributions will depend on the perceived legitimacy of the donation request. Bouma et al. (2014) find that respondents who perceive the decentralization of natural resource management as legitimate

are more likely to contribute than respondents who perceive this to be a government task. We expect respondents who perceive the donation request as legitimate to have a higher willingness to donate. We have no expectation about the impact on hypothetical bias.

Warm Glow from Giving (Social Preference)

Attention to social preferences has boomed since experimental studies showed that actors are less self-interested than assumed in standard economic theory (Mullainathan and Thaler 2000). The literature suggests different explanations for this behavior, including inequality aversion and reciprocity (Charness and Rabin 2002) and warm glow (Andreoni 1990), warm glow being the utility that people derive from the act of giving. We expect warm glow to increase willingness to pay (see also Kahneman and Knetsch 1992) but have no expectation about its impact on hypothetical bias.

Social Expectations

Fischbacher and Gächter (2010) indicate that expectations about other people's behavior are an important factor explaining voluntary contributions. Abeler et al. (2011) find that subjects with high expectations contribute more than subjects with low expectations, a finding confirmed by Bardsley and Sausgruber (2005) and Alpizar, Carlsson, and Johansson-Stenman (2008). Alpizar, Carlsson, and Johansson-Stenman (2008) suggest that this outcome is driven by conformist behavior, that is, the utility that people derive from behaving in line with others. Hence, we expect that subjects with higher expectations about other people's contributions will display a higher willingness to pay. Given that social expectations may carry some strategic bias (Harrison and Rütstrom 2008), we expect social expectations to increase hypothetical bias.

Hypotheses and Hypothesis Testing

As discussed in the introduction, our main goal is to assess the impact of behavioral factors on stated donations and on hypothetical bias in stated donations to semipublic good provisioning. More specifically, we hypothesize that the five behavioral factors we consider affect donations *and* the extent of hypothetical bias in stated donations.

In order to test our hypotheses we obtained data from CV experiments with hypothetical and real donations and estimate separate models on the data samples obtained. In generic form these models are given by

$$WTP_H = f(\text{Revealed behavior; Attitude; Legitimacy; Warm glow; Expectations}), \quad [1]$$

and

$$WTP_A = g(\text{Revealed behavior; Attitude; Legitimacy; Warm glow; Expectations}), \quad [2]$$

where WTP_H and WTP_A represent, respectively, hypothetical and actual willingness to donate to the public good, and $f(\cdot)$ and $g(\cdot)$ represent functions relating behavioral factors to hypothetical and actual willingness to donate, respectively. We estimate the models in equations [1] and [2] and subsequently test equality of the parameters, using the combinatorial test proposed by Poe, Giraud, and Loomis (2005), with which we assess the impact of behavioral factors on willingness to pay and on hypothetical bias in stated willingness to pay. Moreover, we may more accurately assess the relative importance of the different behavioral factors in actual donations to a public environmental good.

To our knowledge this is the first large-scale study that looks into the impact of behavioral factors on hypothetical bias, so there is little we can build on in terms of the expected direction of the behavioral effects. As a working hypothesis, we expect the impact of most behavioral factors on hypothetical bias to have the same direction as their impact on donations, except for proenvironmental attitude and revealed behavior, where we expect a positive impact on willingness to pay, but a negative impact on hypothetical bias.

3. CV and Survey Design

We developed a stated preference survey in which we measure behavioral factors related

to the public good dimension of environmental goods and services. We created three versions of the survey in order to capture hypothetical bias. The first version is a classical CV survey, the second version includes a cheap talk script (Cummings and Taylor 1999) and the third version presents respondents with a real donation request. To make sure that the hypothetical bias of our hypothetical treatments is as small as possible we are explicit about the payment vehicle and provide information to contextualize the donation request, as suggested by Loomis (2011), Murphy et al. (2005) and List and Gallet (2001). Also, in line with Johnston et al. (2017), we pay explicit attention to the credibility of the information provided and the background of and reasons for requesting a donation, our study explicitly testing how these factors affect value estimates and hypothetical bias therein. We take account of bounded rationality (Hausman 2012) by reducing survey complexity. We explain the donation request as simply as possible and provide additional information about the background of the donation request (Johnston et al. 2017; see also Appendix A).The donation vehicle is the same across treatments: respondents are asked to contribute to an existing fund that contracts farmers to provide agrienvironmental conservation on their land. Previously, this fund was financed by the government, but due to budget cuts, agrienvironmental conservation increasingly depends on private cofunding. In addition to socioeconomic characteristics (age, level of education, income, and distance to the study site), we collected information about respondent characteristics in terms of the five behavioral factors. Below we discuss how we measured these factors empirically.

1. *Revealed proenvironmental behavior:* We measured revealed proenvironmental behavior by asking whether the respondent is a member of a nature-related organization, and whether the respondent donates to environmental causes. In addition, we asked for the respondent's assessment of his or her share of expenditures on ecologically certified groceries.
2. *Proenvironmental attitude:* We measured attitude by asking respondents whether they would like to see more attention for the protection of biodiversity (species richness) and nature in national and regional policies.
3. *Perceived legitimacy of the donation request*: We measured the perceived legitimacy of the donation request by asking respondents to what extent they agree with the development that nature conservation is no longer fully funded by the government and as a result has become partly dependent upon voluntary contributions by citizens.
4. *Warm glow from giving*: We measured the warm glow of giving by asking respondents whether they get a good feeling from donating to charity.
5. *Social expectations*: We measured social expectations by informing respondents that before this study we did a prestudy in which we asked a large number of households how much they would be willing to donate. Subsequently, in the survey we asked respondents about their expectation of the share of donating respondents and the average donated amount.[1]

For the questions relating to donation behavior (warm glow) we used questions from the Dutch survey Geven in Nederland, which annually collects information about donation behavior in the Netherlands (Bekkers and Wiepking 2011). For questions about environmental attitudes and perceived legitimacy we referred to Milfont and Duckitt (2010).

The CV question focuses on Farming for Nature, a Dutch agrienvironmental conservation program that specifically focuses on the buffer zones of protected areas (Stortelder and Kiers 2011) and has proven effective in enhancing biodiversity on agricultural land itself and in adjacent protected areas (Westerink et al. 2013). Until recently, the program was financed by the government, but severe budget cuts and a belief that consumers are willing

[1] In this study we focus on the extent to which social expectations help explain the gap between stated and revealed willingness to pay. In an accompanying paper (Koetse and Bouma 2017) we further analyze the effects of social expectations on donation decisions, and whether feedback about people's expectations affects donations, for example, by providing a reference point.

to voluntarily contribute to nature conservation have made upscaling of the Farming for Nature approach dependent upon private cofinancing.

In the CV experiment we explained that the payment mechanism is a donation to a fund that leases out land to farmers that use the Farming for Nature approach. To avoid anchoring effects, we presented respondents with a payment card including a wide range of possible donations. We pretested the range twice before survey implementation and also provided respondents with the opportunity to make a donation that is not included in the list.

The cheap talk script we used was originally based on one by Cummings and Taylor (1999), but in line with Aadland and Caplan (2006) we use a shorter version that basically reminds respondents to seriously consider their households' available financial resources in answering the survey. Respondents in the actual donation treatment were reminded twice of the fact that the donation request is an actual request (right at the beginning of the survey, and also in the explanation of the CV experiment). The survey was pretested twice and implemented in April 2015. An excerpt of the survey is provided in Appendix A; the full survey is available upon request. Appendix B contains the three versions of the CV question.

4. Data Collection and Descriptive Statistics

Respondents were sampled from a Dutch online respondent panel owned by KANTAR,[2] which includes around 124,000 respondents from around 65,000 households. The panel is established through random sampling, meaning that each household has an equal chance of being in the panel as long as it is willing to participate, ensuring that the panel is representative for the entire Dutch population on main variables: age, gender, education, and geographical region. The panel is also regularly updated in order to keep the panel representative, mainly by invitation from KANTAR. Moreover, KANTAR has a substantial amount of regularly updated information on each respondent, which means that for any region in the Netherlands they can apply a representative sampling procedure, instead of just a random one. All our treatment samples were drawn from the panel's 18 years of age or older population separately, with identical representative sampling for each sample, using age, gender, education, and political preference (2012 elections) as variables. In selecting respondents we paid specific attention to location, as the CV question refers to the Farming for Nature area at a location in Twente (east of the Netherlands). While keeping the samples representative in terms of age, gender, education, and political preference (2012 elections), we oversampled respondents who live closer to the study area to avoid low variation in donation behavior, as respondents living farther from Twente may not be willing to donate due to distance decay effects.[3] To minimize this risk we made rings around the study area, ring 1 being the ring closest to the study area, and ring 4 being the ring farthest from the study area. The sampling procedure was aimed at obtaining the following distribution: ring 1, 37.5%; ring 2, 25%; ring 3, 18.75%; and ring 4, 18.75%. Because this regional oversampling could affect the sample-wide mean *WTP*, we include the distance of the respondent's residence to the study location as a covariate in our models, thereby testing whether there is a distance decay effect. As shown and discussed in the next sections we find there is no such effect, suggesting that our regional oversampling has had little to no effect on our mean *WTP* estimates. Also, this suggests that we are measuring nonuse values more than use values.[4]

[2] KANTAR is a worldwide data and marketing research company (www. kantar.com).

[3] Although there is oversampling from regions nearer to the study locations, the sampling is such that all treatment samples are still representative for the Netherlands in terms of age, gender, education, and political preference (2012 elections).

[4] In a parallel study we focus more on landscape use values by estimating values for landscape aesthetics (see Bouma and Koetse 2016, table 6). In this case we did find distance decay effects, clearly showing the differential effects of distance decay between use and nonuse values.

Table 1
Response Rate of the Different Treatments

	Response Rate (percent)	Number of Completed Questionnaires	Number of Questionnaires Distributed
Treatment 1: Standard CV	43	462	1,072
Treatment 2: Cheap talk CV	41	437	1,071
Treatment 3: Donation request CV	18	434	2,472

Table 2
Summary Statistics, Including Nonresponse

	Response	Nonresponse
Percentage female	50	48
Age (years)	50	47
Percentage above 50 years old	51	41
Percentage of highly educated (technical college and university)	38	34
Gross income (euros)	50.229	49.505
Average number of funds the respondent donates to	5.23	4.75
Percentage of respondents who consume certified green products	40	34
Distance from Twente (kilometers)	86	88
Number of respondents	1,333	3,282

Table 3
Hypothetical, Semihypothetical (Cheap Talk), and Actual Willingness to Donate

	Treatment 1: Standard CV, Stated	Treatment 2: Cheap Talk CV, Stated	Treatment 3: Donation Request, Stated	Treatment 3: Donation Request, Revealed
Percentage willing to contribute	56	58	23	7
Average donation of donating respondents (euros)	23	22	16	17
Number of donating respondents	259	253	100	30

Table 1 presents the response rate across treatments. The response rate of the first two treatments is 42%, whereas the response rate of respondents receiving an actual donation request is less than 20%. In the analysis we account for this difference and the associated potential sample selection bias by using a two-step Heckman model, which we further explain in Section 5. In using a two-step Heckman model we also control for the differences between those that chose to respond to the survey, and those that did not: those that chose to respond were on average slightly older, more highly educated, and more likely to consume certified green products and donate to societal goals, as the summary statistics presented in Table 2 indicate.

With regard to the CV question, the results in Table 3 indicate that the willingness to donate and average donation of donating respondents differ significantly between treatments. The last column shows the number of respondents that actually transferred money, in the third treatment group.

Between the standard CV and the cheap talk CV questions there is no significant difference in the amount donated and willingness to contribute (Mann-Whitney test z-value of 0.365). This is partly in line with recent findings by Howard et al. (2017), who find that the effect of cheap talk scripts in a choice experiment setting is transient. However, between the standard CV and the actual donation request, and between the cheap talk CV and the actual donation request, there is a significant difference, both in the number of people willing to donate and in the donated amount (Mann-Whitney z-values of –10.2 and

Table 4
Summary Statistics per Treatment Group

	Treatment 1: Standard CV	Treatment 2: Cheap Talk CV	Treatment 3: Donation Request
Average donation (including nondonating respondents)	12.9 (31.3)	12.7 (31.6)	3.6 (10.0)
Socioeconomic characteristics			
Average monthly disposable income per household member	493.8 (476.6)	448.2 (383.0)	510.3 (454.1)
Dummy: Age above 50 years (percent)	53	55	52
Percentage highly educated	37	34	44
Average distance from Twente (kilometers)	86.7 (49.7)	85.3 (47.9)	87.5 (50.7)
Revealed proenvironmental behavior			
Average percentage of ecologically certified groceries	11.7	10.6	10.9
Average percentage of respondents who already donate to nature organizations	42	36	35
Proenvironmental attitude			
Respondent believes that biodiversity should be better protected (percent)	53	52	50
Perceived legitimacy of the donation request			
Respondent believes it just that nature conservation has become dependent on private contributions (percent)	28	28	26
Warm glow from giving			
Respondent gets warm glow from giving (percent)	47	44	46
Social expectations			
Average expected percentage of donating respondents	24.6 (17.9)	25.2 (18.3)	19.0 (16.3)
Average expected donation per donating respondent	22.1 (24.4)	22.4 (26.0)	16.4 (20.6)
Number of respondents	462	437	434

Note: Standard errors in parentheses.

–10.6, respectively). The combined effect is that the standard CV question overestimates the willingness to donate by a factor 3.5, comparable with the factor of 3 difference found by List and Gallet (2001) and Murphy et al. (2005).

In further analyzing this treatment effect in the next section, we control for potential selection bias resulting from the lower response rate in the donation request treatment. Results show that although there are selection effects, these effects do not lead to selection bias. Also, the summary statistics presented in Table 4 indicate that there are no significant differences in respondent characteristics, beliefs, and preferences between treatments. Exceptions are respondent expectations of the percentage of respondents that will contribute and the stated average donation amount, which we will account for in the analysis. Specifically, between treatments 1 and 2, differences in expectations are not significant, but between the first two treatments and treatment 3, differences are significant (Mann-Whitney test z-values of –5.8 and –5.2, respectively, for the percentage of donating households, and z-values of –3.9 and –4.8 for the average donation).

Note that only 7% of the respondents in the actual donation treatment actually made a donation to the Farming for Nature fund. Interestingly, respondents who made a donation transferred exactly the amount they stated, but only a third of the respondents who indicated wanting to contribute actually did. This may have to do with the fact that respondents had only a couple of weeks to make the transfer and did not receive a reminder as KANTAR (the panel data owner) did not want us to bother its respondents with reminders and follow up emails. Still, we further analyze actual donation behavior in the next section to better understand what is going on.

5. Model and Estimation Results

For model estimation we use a two-step Heckman model in order to correct for potential sample selection bias, especially for the real donation treatment, which had a much lower response rate than the hypothetical treatment

and the cheap talk treatment. In the model we first estimate the probability of the respondent participating in the survey, and second the respondent's willingness to donate. We do this to account for potential sample selection bias arising from the fact that the characteristics of the group responding to the survey are somewhat different for the response and the nonresponse groups (Heckman 1979), but most of all because nonresponse is much larger for the actual donation treatment, implying there might be treatment-specific selection effects.

We conduct three types of analyses. First, we perform an analysis of the pooled treatment data in order to assess the relative importance of the different behavioral factors. Second, we analyze the three treatments separately. We do this to assess the differential impact of behavioral factors on donations, with the central aim of obtaining insights into the factors that determine hypothetical behavior. In this analysis we use three model specifications in which we gradually add relevant explanatory variables. We start with a basic model that includes only respondent characteristics. We subsequently add revealed behavior and environmental attitudes (proenvironmental attitudes and perceived legitimacy), and finally we add social preferences (warm glow) and social expectations. Although Gächter and Renner (2010) argue that when belief elicitation is not incentivized there is no significant impact of expectations on the amount donated, to avoid potential endogeneity issues we use the expected percentage of other respondents donating instead of the expected donation amount (which may be endogenous to a respondent's donation; see Costa-Gomes, Huck, and Weizsäcker 2014 and Smith 2013). In each of the models discussed so far, the first step of the Heckman estimation, namely, the probability of the respondent answering the survey, is identical. Given that we used a respondent panel, we have information about nonrespondents, including age, gender, education, income, and revealed proenvironmental behavior, which we use in the first estimation step.

Third, we zoom in on treatment 3, the actual donation request, in order to uncover the factors that determine which respondents actually transfer funds. First, we repeat the Heckman analysis, replacing the dependent variable "stated donation amount" with the dependent variable "transferred donation amount." Second, we analyze the subsample of respondents that indicate they are willing to donate. On this subsample we conduct a probit analysis to assess the probability that the respondent actually transfers the funds.[5]

Estimation Results: Pooled Treatment Data

Table 5 summarizes the results of the pooled treatment data analysis. There are several interesting findings. First, the actual donation treatment (treatment 3) has a statistically significant negative impact on both the decision to respond to the survey and the donated amount. In addition, revealed preferences for green consumption and revealed donation behavior are important explanatory factors with respect to response rate; respondents that already donate and consume ecologically certified products are more likely to respond. With respect to the donated amount, the findings indicate that hypothetical bias in both the standard and cheap talk CV treatments is substantial.

Second, all of the behavioral factors have the expected impacts; a proenvironmental attitude and perception that the donation request is legitimate increase donations, and warm glow feelings and a positive expectation about the number of people donating increase donations as well. We also find that people who already donate to similar goals and have a higher propensity for green consumption donate more. There are also clear income and education effects, but no distance decay effect, which may be explained by the fact that we are measuring nonuse rather than use values.

Third, expectations about other people's behavior are influenced by treatment. Interestingly, when including respondent expectations, the donation request treatment has a smaller and statistically insignificant negative impact on the donation amount. Hence, hypothetical bias seems to affect the donated

[5] For robustness we also conducted a logit regression, but since this did not change the findings we do not present those results here. Results are available upon request from the authors. All model estimations were done using Stata 11.

Table 5

Heckman Model Explaining Willingness to Donate (Amount), Accounting for Nonresponses

	Basic Model	Plus Revealed Behavior	Plus Proenvironmental Attitude	Plus Legitimacy (Perceived)	Plus Warm Glow	Plus Social Expectations
Step 2: Donated Amount						
Constant	8.77***	4.47	1.71	–0.22	–1.88	–6.69
	(3.60)	(3.81)	(4.01)	(4.00)	(4.14)	(4.47)
Treatment effects						
Cheap talk treatment (treatment 2)	0.18	0.99	1.33	1.41	1.16	0.29
	(2.11)	(2.09)	(2.14)	(2.13)	(2.14)	(3.60)
Donation request treatment (treatment 3)	–9.05***	–8.68***	–8.43***	–7.93***	–8.20***	–4.38
	(2.48)	(2.52)	(2.59)	(2.59)	(2.64)	(3.73)
Socioeconomic characteristics						
Respondent above 50	3.50*	3.14*	2.44	2.51	2.71	2.67
	(1.82)	(1.81)	(1.87)	(1.86)	(1.88)	(1.86)
Distance to Twente (kilometers)	0.003	0.005	0.006	0.007	0.009	0.008
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Monthly disposable income per household member	0.008***	0.008***	0.008***	0.007***	0.007***	0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Respondent highly educated	4.81***	3.86**	3.39*	2.71	2.59	3.25*
	(1.83)	(1.82)	(1.87)	(1.88)	(1.89)	(1.88)
Revealed proenvironmental behavior						
Respondent donates to nature conservation		6.15***	4.14**	3.21*	2.33	2.06
		(1.79)	(1.88)	(1.89)	(1.94)	(1.92)
Percentage ecologically certified groceries consumed per week		0.16***	0.14**	0.14**	0.12**	0.08
		(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Proenvironmental attitude						
Respondent believes biodiversity should be better protected			7.51***	8.03***	7.24***	6.31***
			(1.83)	(1.83)	(1.85)	(1.85)
Perceived legitimacy of the donation request						
Respondent believes it just to cofinance nature conservation				7.93***	7.60***	7.06***
				(1.94)	(1.94)	(1.94)
Warm glow						
Respondent receives a warm glow from giving					5.38***	5.50***
					(1.83)	(1.82)
Social expectations						
Expected percentage of donating households						0.23***
						(0.09)
Cheap talk × Social expectation						0.03
						(0.12)
Actual request × Social expectation						–0.14
						(0.12)
Step 1: Probability of Response						
Cheap talk treatment (treatment 2)	–0.03	–0.03	–0.03	–0.04	–0.04	–0.04
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Donation request treatment (treatment 3)	–0.72***	–0.72***	–0.73***	–0.74***	–0.74***	–0.74***
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Age	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Distance to Twente (kilometers)	–0.00	–0.00	–0.00	–0.00	–0.00	–0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

(table continued on following page)

Table 5

Heckman Model Explaining Willingness to Donate (Amount), Accounting for Nonresponses *(continued)*

	Basic Model	Plus Revealed Behavior	Plus Proenvironmental Attitude	Plus Legitimacy (Perceived)	Plus Warm Glow	Plus Social Expectations
Log gross annual income	0.02	0.02	0.02	0.02	0.02	0.02
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Respondent highly educated	0.10**	0.10**	0.11**	0.12**	0.12**	0.12**
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Number of funds respondent donates to	0.005	0.005	0.006	0.006	0.006	0.006
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Respondent consumes green products	0.08*	0.08*	0.08*	0.09*	0.09*	0.09*
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Constant	–0.75*	–0.75*	–0.80*	–0.82*	–0.82*	–0.82*
	(0.43)	(0.43)	(0.44)	(0.44)	(0.44)	(0.44)
Number of observations	3,534	3,534	3,497	3,492	3,476	3,476
Number of censored observations	2,445	2,445	2,445	2,445	2,445	2,445
Inverse Mills ratio	–3.28	–2.58	–2.59	–2.63	–2.47	–2.56
	(2.60)	(2.79)	(2.86)	(2.84)	(2.94)	(2.84)

Note: Standard errors in parentheses.
*, **, *** Statistically significant at 10%, 5%, and 1%, respectively.

amount directly and indirectly through its effects on the expectation of other people's behavior. The latter suggests that respondents apparently anticipate hypothetical behavior by others in a hypothetical donation request.

We compare the statistical significance of the different models by comparing predicted donations with stated donations. We find that the correlation between predicted and stated donations is 0.26 for the basic model (R^2 of 0.07), 0.34 for the model including individual attitudes, beliefs, and preferences (revealed behavior, proenvironmental attitude, legitimacy; R^2 of 0.12), and 0.37 for the model that also includes social preferences and expectations (R^2 of 0.14). Hence, adding prior, revealed behavior and environmental attitudes improves the explanatory power of the model most, but adding social preferences and expectations also improves the explanatory power of the analysis. The fact that the inverse Mills ratio of the different models is insignificant suggests that although there clearly is selection, especially in treatment 3, this has not led to any biases in our estimates. We also estimate Heckman models with alternative model specifications, including explanatory variables such as gender and political affiliation, but since this does not affect the findings (and given that coefficients on these additional variables prove to be statistically insignificant) we do not present the findings here.

Estimation Results: Treatment-Specific Analysis

Table 6 presents the results of the treatment-specific analysis, which is aimed mainly at demonstrating the effects of the behavioral factors on hypothetical bias. The most important results are that point estimates on almost all behavioral explanatory variables (exception is the percentage of ecologically certified groceries consumed per week) are substantially larger in the hypothetical treatments (treatments 1 and 2) than in the actual donation treatment (treatment 3), and that most behavioral factors remain significant in explaining the variation in donations in the actual donation treatment (treatment 3). Also, the effects of some important socioeconomic factors appear to be different in the hypothetical and the real donation treatments, specifically income, age, and education.

In order to test the statistical significance of differences between the coefficients obtained for the different treatments, we apply the random sampling procedure proposed by Poe, Giraud, and Loomis (2005, 359). Because the most interesting differences are between treat-

Table 6

Heckman Model Explaining the Donated Amount per Treatment, Accounting for Nonresponse

	Basic Model			Plus Individual Factors (Revealed, Attitude, Legitimacy)			Plus Social Factors (Warm Glow, Expectations)		
Treatment	Standard CV (Treatment 1)	Cheap Talk (Treatment 2)	Actual Request (Treatment 3)	Standard CV (Treatment 1)	Cheap Talk (Treatment 2)	Actual Request (Treatment 3)	Standard CV (Treatment 1)	Cheap Talk (Treatment 2)	Actual Request (Treatment 3)
Step 2: Donated Amount									
Constant	10.07	3.71	3.52	0.51	–8.73	–0.24	–6.52	–16.79	–3.19
	(6.62)	(7.53)	(3.23)	(7.30)	(4.10)	(3.81)	(7.56)	(8.23)**	(4.43)
Socioeconomic characteristics									
Respondent above 50	1.57	6.71	2.33	0.69	4.93	2.20	0.88	5.03	2.39
	(3.75)	(4.09)*	(1.10)**	(3.81)	(4.10)	(1.11)**	(3.78)	(4.11)	(1.11)**
Distance to Twente (kilometers)	–0.02	0.03	–0.00	–0.01	0.05	–0.00	–0.03(0.04)	0.06	–0.00
	(0.03)	(0.04)	(0.00)	(0.04)	(0.04)	(0.01)		(0.04)	(0.01)
Average monthly disposable income per household member	0.01	0.008	0.005	0.01	0.005	0.004	0.01	0.006	0.004
	(0.004)***	(0.005)	(0.001)***	(0.004)**	(0.005)	(0.001)***	(0.004)***	(0.005)	(0.001)***
Respondent highly educated	8.38	5.20	1.49	5.86	4.16	–0.02	6.82	4.64	0.20
	(3.74)**	(4.14)	(1.12)	(3.85)	(4.06)	(1.19)	(3.84)*	(4.06)	(1.21)
Revealed behavior									
Respondent donates to nature conservation				4.45	3.06	1.10	2.24	1.75	0.82
				(3.80)	(3.98)	(1.17)	(3.86)	(4.11)	(1.18)
Percentage ecologically certified groceries consumed per week				0.13	0.29	0.07	0.03	0.22	0.05
				(0.11)	(1.52)*	(0.04)**	(0.12)	(0.16)	(0.04)
Proenvironmental attitude									
Respondent believes biodiversity should be better protected				7.63	13.81	3.71	5.06	12.07	3.25
				(3.75)***	(3.90)***	(1.11)***	(3.80)***	(3.93)***	(1.12)***
Perceived legitimacy of the donation request									
Respondent believes it just to cofinance conservation				8.13	12.61	4.12	6.78	11.96	3.56
				(3.86)**	(3.99)***	(1.25)***	(3.85)***	(3.98)***	(1.14)***
Warm glow									
Respondent receives a warm glow from giving							9.77	5.76	1.90
							(3.69)**	(3.81)	(1.11)*
Social expectations									
Expected percentage of donating households							0.28	0.22	0.10
							(0.11)***	(0.10)**	(0.03)***

(table continued on following page)

Table 6

Heckman Model Explaining the Donated Amount per Treatment, Accounting for Nonresponse *(continued)*

	Basic Model			Plus Individual Factors (Revealed, Attitude, Legitimacy)			Plus Social Factors (Warm Glow, Expectations)		
Treatment	Standard CV (Treatment 1)	Cheap Talk (Treatment 2)	Actual Request (Treatment 3)	Standard CV (Treatment 1)	Cheap Talk (Treatment 2)	Actual Request (Treatment 3)	Standard CV (Treatment 1)	Cheap Talk (Treatment 2)	Actual Request (Treatment 3)
Step 1: Probability of Response									
Age	0.01	0.01	0.001	0.01	0.01	0.001	0.01	0.01	0.001
	(0.002)***	(0.003)***	(0.002)	(0.002)***	(0.003)***	(0.002)	(0.002)***	(0.003)***	(0.002)
Distance to Twente (kilometers)	0.00	–0.00	–0.00	0.00	–0.00	–0.00	0.00	–0.00	–0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Log gross annual income	0.10	–0.03	0. 01	0.10	–0.02	0. 01	0.10	–0.03	0.02
	(0.08)	(0.08)	(0.06)	(0.08)	(0.08)	(0.06)	(0.08)	(0.08)	(0.06)
Respondent highly educated	0.15	–0.07	0.17	0.16	–0.09	0.19	0.17	–0.08	0.20
	(0.10)	(0.10)	(0.07)**	(0.10)*	(0.10)	(0.07)**	(0.10)*	(0.10)	(0.07)**
Number of funds respondent donates to	–0.00	0.00	0.01	0.00	0.00	0.01	0.00	–0.00	0.01
	(0.00)	(0.00)	(0.006)**	(0.00)	(0.00)	(0.006)**	(0.00)	(0.00)	(0.006)**
Respondent consumes green products	0.09	–0.02	0.13	0.10	–0.02	0.13	0.09	–0.02	0.14
	(0.09)	(0.09)	(0.07)*	(0.09)	(0.09)	(0.07)*	(0.09)	(0.09)	(0.07)*
Constant	–1.78	–0.34	–1.19	–1.79	–0.50	–1.28	–1.82	–0.46	–1.32
	(0.87)**	(0.87)	(0.61)*	(0.87)**	(0.88)	(0.61)**	(0.87)**	(0.87)	(0.62)*
Number of observations	818	826	1,890	807	815	1,870	804	808	1,864
Number of censored observations	455	472	1,518	455	472	1,518	455	472	1,518
Inverse Mills ratio	–5.17	–2.56	–2.42	–4.58	–2.69	–1.73	–4.62	–2.63	–1.31
	(4.82)	(5.85)	(1.96)	(4.94)	(5.67)	(2.31)	(4.88)	(5.61)	(2.67)

Note: Standard errors in parentheses.

*, **, *** Statistically significant at 10%, 5%, and 1%, respectively.

ment 1 and treatment 3 we compare only coefficients from these two treatments. The results from Poe, Giraud, and Loomis's (2005) test show that differences in point estimates are statistically significant for income (p-value 0.015), education (p-value 0.050), social expectations (p-value 0.056), and warm glow (p-value 0.019).[6] These insights suggest that socioeconomic (especially education and income) and behavioral factors (especially social expectations and warm glow) may affect donations, judging by the statistical significance of coefficients in treatment 3, but also affect the degree of hypothetical bias, judging by the differential impact of these factors on donations in treatments 1 and 3.

Overstating the willingness to pay or donate thereby appears to be related to most of the social behavioral factors included in our analysis, but in terms of magnitude and statistical significance the results are most pronounced for income and education and for social expectations and warm glow. In addition, it appears that the relative importance of explanatory variables changes between treatments. For example, warm glow is especially important for explaining behavior in the standard CV treatment, whereas a proenvironmental attitude is an important factor explaining donation behavior in the donation request. This is in line with Kotchen and Reiling' (2000) findings that a proenvironmental attitude reduces illegitimate answers and protest votes. Furthermore, it is interesting that revealed donation behavior and green consumption appear to be significant factors in the basic model, but when social expectations, environmental attitude, warm glow, and perceived legitimacy are included, their significance wanes. This seems to indicate that revealed behavior is not correlated only with individual preferences, but is correlated with many other behavioral factors, such as social expectations, perceived legitimacy, and warm glow, as well.

[6] For completeness, differences in point estimates are statistically insignificant for respondents above 50 years of age (p-value 0.336), distance to Twente in kilometers (p-value 0.294), revealed behavior (p-values 0.350 and 0.441, respectively), proenvironmental attitude (p-value 0.338), and perceived legitimacy (p-value 0.212).

Estimation Results, Actual Donation Treatment: Who Transfers?

We now turn to a more detailed analysis of the actual donation treatment, focusing on respondents who actually transfer funds. For this we set all positive donations that were not transferred equal to zero, in other words, we treat all nontransferred donations as zero donations (see Table 3 for details). The findings of the Heckman model with these actual transferred donations as the dependent variable are presented in Appendix C. The results indicate that disposable income, the perceived legitimacy of the donation request, and beliefs about the need for and importance of biodiversity conservation continue to affect donations. Expectations about what others will do and warm glow feelings no longer have a significant impact. The average percentage of ecologically certified groceries that the respondent purchases remains a significant indicator of respondents' actual donations. When we zoom in on the factors that explain whether respondents who state a positive willingness to donate also make the promised donation, we find something interesting. As the findings in Table 7 indicate, respondents who actually transfer the money are the ones who believe that others will not donate, or, in other words, the higher the expected number of other people donating, the lower the likelihood that the respondent transfers the stated amount.

Clearly, given our limited sample size, further research is needed to test whether these findings hold for a larger sample, but the current findings indicate that the factors determining stated willingness to pay differ significantly and substantially from the factors that determine actual donation behavior. More specifically, feelings of warm glow and the expectation of others donating have a strong, positive impact on stated donation amounts, but these effects disappear when analyzing what explains the actually transferred amounts. Social expectations do affect the probability that a stated donation amount is actually transferred, but in the opposite direction, that is, people with lower expectations about the percentage of donating households are more likely to actually transfer the stated donation amount.

Table 7
Probit Analysis of Probability That Respondents with Positive Stated Willingness to Pay Actually Transfer the Donation

	Coefficient	Marginal Effect
Constant	0.80 (0.49)	
Respondent above 50	0.36 (0.31)	
Distance to Twente (kilometers)	–0.00 (0.00)	
Monthly disposable income per household member	0.00 (0.00)	
Respondent highly educated	0.31 (0.30)	
Respondent donates to nature conservation	–0.70** (0.34)	–0.22
Percentage ecologically certified groceries consumed per week	–0.00 (0.00)	
Respondent believes biodiversity should be better protected	0.47 (0.35)	
Respondent believes it just to cofinance conservation	0.69** (0.32)	0.23
Respondent receives warm glow from giving	–0.39 (0.34)	
Expected percentage of donating households	–0.02* (0.01)	–0.005
Number of observations	96	
Adjusted pseudo-R^2	0.14	

Note: Standard errors in parentheses.
*, ** Statistically significant at 10% and 5%, respectively.

Caveats apply, as respondents had only a couple of weeks to make the transfer. Still, the findings suggest that more research is warranted to better understand donation behavior and the role of behavioral factors, and to use this information for the improvement of stated preference methods and understanding of hypothetical bias therein.

6. Conclusions

The aim of this paper was twofold: first, to assess the extent of hypothetical bias in CV studies and the impact of behavioral factors on this bias, in order to improve the design of stated preference methods, and second, to understand people's willingness to donate to semipublic good provisioning, in order to assess the extent to which private financing of public goods may substitute or complement public financing. For this we performed a CV experiment, using three treatments: a treatment with a standard hypothetical CV question as control, a treatment with a hypothetical CV question including a cheap talk script, and a treatment with an actual donation request. Our analyses generated four key findings, which we briefly summarize below.

First, we find that on average, respondents in the actual donation request treatment are less likely to donate and also donate less. Specifically, the willingness to donate is half that of the standard CV and cheap talk CV treatment, and the donation amount is around 30% lower. The combined effect is that the standard CV treatment overestimates the willingness to donate by a factor of 3.5, which is in line with the literature (e.g., List and Gallet 2001). Further, in line with Moser, Raffaelli, and Notaro's (2014) results, we find that the cheap talk script has no effect on the willingness to donate. While Cummings and Taylor (1999) suggest that the cheap talk script tackles the hypothetical bias of CV studies, we do not find the cheap talk CV treatment to have a significant impact on reducing hypothetical bias, neither in reducing the estimated probability that respondents donate nor in reducing the donated amount.

Second, we find that behavioral factors play a major role in *stated* donation behavior. Specifically, we find that a proenvironmental attitude, warm glow feelings, a perception that the donation request is legitimate, and a positive expectation that others will donate significantly and substantially increase the *stated* donation amount. Also, we find that the higher the share of ecologically certified groceries purchased by the respondent, the higher the stated donation amount, and that income and education increase stated donations significantly. Distance decay effects have no significant impact.

Third, we find that the significance and explanatory power of socioeconomic and behavioral factors decreases substantially in the real donation treatment, implying that these factors affect actual donations less and increase the amount of hypothetical bias in CV estimates. Socioeconomic factors that increase hypothetical bias are income and education. With respect to behavioral factors, two stand out: Warm glow feelings increase the willingness to donate more in the hypothetical treat-

ments, and respondents' expectations about other people's donation do too. Specifically, in the standard CV and cheap talk CV treatment respondents expect, on average, that 25% of the respondents will donate, while in the actual donation request treatment this is 19%. These higher expectations in hypothetical situations seem to trigger an overstatement of the stated donation amount, making social behavioral factors an important driver of hypothetical bias in stated preference studies using a nonbinding payment vehicle. For the more individual behavioral factors (revealed behavior, proenvironmental attitude, and perceived legitimacy) effects are more uncertain; although point estimates differ substantially between treatments, the differences are not statistically significant.

Fourth, when considering the actual donation amounts that were transferred in the real donation treatment, we find that social expectations have the opposite effect: respondents who believe that few others will donate are more likely to actually transfer the stated donation amount. These findings have to be interpreted with caution because the number of observed transactions is small and respondents received no reminder to transfer the stated amount. Still, they are in line with findings from the experimental literature, which suggest that roughly 10% of the population is altruistic and driven by intrinsic motivations, and that the majority consists of conditional cooperators who let their contribution depend on what others do (Fischbacher, Gächter, and Fehr 2001; Fischbacher and Gächter 2010). It is this majority that says it will contribute, but when the moment comes to transfer funds, their contributions are conditional on what others do. Without a mechanism to trigger mass donations like, for example, through crowdfunding or mass awareness campaigns, this majority is unlikely to voluntarily contribute to private provision of public goods.

7. Discussion

By considering the impact of behavioral factors on voluntary donations to a semipublic environmental good, our results confirm and complement the recent stated preference recommendations made by Johnston et al. (2017). Our results indicate that the hypothetical bias of stated preference methods in these settings is largely driven by warm glow and social expectations, respondents considering their expectation of other people's behavior before they decide what amount to state. The study further confirms the importance of respondent attitudes and motivations, and of the perceived legitimacy of the donation request. It recommends that these factors be tested during pretesting of stated preference valuation studies, especially when a nonbinding payment vehicle or a potentially noncredible payment vehicle is used.

More specifically, with regard to warm glow, the findings indicate that CV studies may be improved by making respondents aware of the possible effect of warm glow on stated donations, similar to using a cheap talk script. Another and potentially more effective approach is to explicitly ask respondents whether they get warm glow feelings from donating, and to control for these effects in a regression setting—similar to the approach used in this paper. It also implies that mean donations are no longer the metric of interest, but rather the outcome of a regression analysis from which the effects of warm glow are filtered out.

With regard to people's tendency to conform to what they expect others will do, different processes may be at work, each with different potential consequences for the design of CV studies. First, when people are uncertain about their own value for a specific nonmarket good or service, they may refer to how they think other people value the good. A solution to this specific issue, in line with Champ and Bishop (2001), is to measure people's level of certainty on their stated donation, and remove people with lower levels of certainty from the sample. This approach has the disadvantage that in many settings the sample could be reduced substantially. An alternative or complementary approach may be to use insights from the preference learning literature (e.g., Holmes and Boyle 2005), for example, by allowing people to form their preferences and values during their partic-

ipation in the study. Although choice experiments are more naturally suited for such a process because respondents are confronted with various choice questions, CV studies may incorporate this by including a repetition of valuation questions, using, for example, the learning design proposed by Bateman et al. (2008). Second, people may be uncertain about whether they want to contribute and will therefore make their contribution conditional on what others do (e.g., Fischbacher, Gächter, and Fehr 2001). CV studies could more explicitly account for the conditionality of the stated donation amounts, especially when a voluntary contribution mechanism is used. For example, by asking respondents about their expectations of other people's donation behavior and relating this to the stated donation amounts, the conditionality of the stated donations can be made explicit. Moreover, value estimates for different levels of expectations can be derived and used as upper and lower bounds. Ultimately, more research on this issue is needed, which may focus on measuring the impact of people's expectations on their donations and the resulting value estimate *compared to* value estimates obtained for the same CV questions but using nonvoluntary binding payment schemes. Given that governments around the globe are devolving natural resource management to civic groups and nongovernmental organizations, simply demanding that CV studies use a binding payment vehicle that is credible may not be realistic, and more attention needs to be paid to the impact of social behavioral factors on stated preferences estimates.

Finally, given the extent of hypothetical bias found in this study, an important question is to what extent estimates from stated preference and specifically CV studies can be used to assess the value society derives from environmental goods. In this respect, the literature consistently indicates that the hypothetical bias of stated preference studies is approximately a factor 3; we find a factor of 3.5 in our analysis. Applying this correction factor to standard hypothetical CV results is a possible way to arrive at more accurate value estimates. Problematic in this respect, next to the crudeness of the approach, is that when we consider only those people that transfer the donation in the real donation treatment, the difference between actual and hypothetical donations goes up by around a factor of 11, because only 7% of respondents transfer their donation instead of the 23% that indicated a willingness to contribute. The discussion then becomes how to interpret why only 7%, instead of the 23% that indicated wanting to make a donation, actually transferred their donation. One explanation is that this is simply because we could not send out reminders, and people in the actual donation treatment needed more time. In that case, the 23% would be a realistic estimate of the number of respondents with a positive willingness to pay, and the factor of 3 would hold. Another explanation would be that a substantial portion of the 23% of respondents with a positive willingness to pay for biodiversity protection would consist of conditional cooperators who need information about other people's contributions before they actually transfer the stated amount. In that case, the 23% would still be a realistic estimate of the number of people with a positive willingness to pay for biodiversity protection, but given a nonbinding payment vehicle, the 7% would be the more realistic estimate of people's willingness to donate to environmental good provisioning. Hence, when looking for an estimate of people's values for environmental good provisioning, the average real *WTP* of a representative person in the Netherlands would be ($23/100 \times 17 =$) €3.91, but when looking for an estimate of the average real willingness to donate of a representative Dutch person, €1.12 ($7/100 \times 16$) would be the better estimate—both compared to the €12.90 for the standard CV approach.

Ultimately, more work is needed to distinguish between willingness to pay and willingness to donate estimates, especially since credible and binding payment vehicles are scarce. Clearly, when a credible and binding payment vehicle is available, this is the first best option, but given the second best world we often live in, controlling for behavioral factors in stated preference studies that use a nonbinding payment vehicle is, in our view, an important addition to the recent recom-

mendations by Johnston et al. (2017) on stated preference methods.

Acknowledgments

The authors would like to acknowledge the input and support of Stichting Boeren voor Natuur, specifically Gerry Bulten and Jos Roemaat, and of Dr. Judith Westerik, Wageningen University, in the development of the survey. The research has been funded by the Dutch Science Foundation (NWO) under the "Biodiversiteit werkt" program, with cofunding from PBL Netherlands Environmental Assessment Agency and the ERA-Net BiodivERsA programme (www.connect-biodiversa.eu/). The authors would like to thank participants of the workshop on experimental economics for the environment, University of Osnabrück, February 2016, the conference of the European Association for Resource and Environmental Economists (EAERE), Athens, June 2017, and several anonymous reviewers for their helpful suggestions and comments.

References

Aadland, David, and Arthur J. Caplan. 2006. "Cheap Talk Reconsidered: New Evidence from CVM." *Journal of Economic Behavior and Organization* 60 (4): 562–78.

Abeler, Johannes, Armin Falk, Lorenz Goette, and David Huffman. 2011. "Reference Points and Effort Provision." *American Economic Review* 101 (2): 470–92.

Alpizar, Francisco, Fredrik Carlsson, and Olof Johansson-Stenman. 2008. "Anonymity, Reciprocity, and Conformity: Evidence from Voluntary Contributions to a National Park in Costa Rica." *Journal of Public Economics* 92 (5): 1047–60.

Andreoni, James. 1990. "Impure Altruism and Donations to Public Goods: A Theory of Warm-Glow Giving." *Economic Journal* 100 (401): 464–77.

Arrow, Kenneth, Robert Solow, Paul R. Portney, Edward E. Leamer, Roy Radner, and Howard Schuman. 1993. "Report of the NOAA Panel on Contingent Valuation." *Federal Register* 58 (10): 4601–14.

Bardsley, Nicholas, and Rupert Sausgruber. 2005. "Conformity and Reciprocity in Public Good Provision." *Journal of Economic Psychology* 26 (5): 664–81.

Baron, David P. 2010. "Morally Motivated Self-regulation." *American Economic Review* 100 (4): 1299–1329.

Bateman, Ian J., Diane Burgess, W. George Hutchinson, and David I. Matthews. 2008. "Learning Design Contingent Valuation (LDCV): NOAA Guidelines, Preference Learning and Coherent Arbitrariness." *Journal of Environmental Economics and Management* 55 (2): 127–41.

Bateman, Ian J., Brett H. Day, Stavros Georgiou, and Iain Lake. 2006. "The Aggregation of Environmental Benefit Values: Welfare Measures, Distance Decay and Total WTP." *Ecological Economics* 60 (2): 450–60.

Bekkers, René, and Pamala Wiepking. 2011. "A Literature Review of Empirical Studies of Philanthropy: Eight Mechanisms That Drive Charitable Giving." *Nonprofit and Volunteer Sector Quarterly* 40 (5): 924–73.

Bernheim, B. Douglas. 1994. "A Theory of Conformity." *Journal of Political Economy* 102 (5): 841–77.

Bishop, Richard C., Kevin J. Boyle, Richard T. Carson, David Chapman, W. Michael Hanemann, Barbara Kanninen, Raymond J. Kopp, Jon A. Krosnick, John List, Norman Meade, et al. 2017. "Putting a Value on Injuries to Natural Assets: The BP Oil Spill." *Science* 356 (6335): 253–54.

Bouma, Jetske A., K. J. Joy, Suhas Paranjape, and Erik Ansink. 2014. "The Influence of Legitimacy Perceptions on Cooperation: A Framed Field Experiment." *World Development* 57: 127–37.

Bouma, Jetske, and Mark Koetse. 2016. *De Betalingsbereidheid van Individuen voor Agrarisch Natuur-en Landschapsbeheer.* The Hague: PBL Netherlands Environmental Assessment Agency.

Brander, Luke M., and Mark J. Koetse. 2011. "The Value of Urban Open Space: Meta-analyses of Contingent Valuation and Hedonic Pricing Results." *Journal of Environmental Management* 92 (10): 2763–73.

Brown, Thomas C., Icek Ajzen, and D. Hrubes. 2003. "Further Tests of Entreaties to Avoid Hypothetical Bias in Referendum Contingent Valuation." *Journal of Environmental Economics and Management* 46 (2): 353–61.

Brown, Thomas C., Patricia A. Champ, Richard C. Bishop, and Daniel W. McCollum. 1996.

"Which Response Format Reveals the Truth about Donations to a Public Good?" *Land Economics* 72 (2): 152–66.

Carson, Richard T. 2012. "Contingent Valuation: A Practical Alternative When Prices Aren't Available." *Journal of Economic Perspectives* 26 (4): 27–42.

Carson, Richard T., Theodore Groves, and John A. List. 2014. "Consequentiality: A Theoretical and Experimental Exploration of a Single Binary Choice." *Journal of the Association of Environmental and Resource Economists* 1 (1–2): 171–207.

Cashore, Benjamin. 2002. "Legitimacy and the Privatization of Environmental Governance: How Non-state Market-Driven (NSMD) Governance Systems Gain Rule-Making Authority." *Governance* 15 (4): 503–29.

Champ, Patricia A., and Richard C. Bishop. 2001. "Donation Payment Mechanisms and Contingent Valuation: An Empirical Study of Hypothetical Bias." *Environmental and Resource Economics* 19 (4): 383–402.

Charness, Gary, and Matthew Rabin. 2002. "Understanding Social Preferences with Simple Tests." *Quarterly Journal of Economics* 117 (3)*:* 817–69.

Cooper, Philip, Gregory L. Poe, and Ian J. Bateman. 2004. "The Structure of Motivation for Contingent Values: A Case Study of Lake Water Quality Improvement." *Ecological Economics* 50 (1–2): 69–82.

Costa-Gomes, Miguel A., Steffen Huck, and Georg Weizsäcker. 2014. "Beliefs and Actions in the Trust Game: Creating Instrumental Variables to Estimate the Causal Effect." *Games and Economic Behavior* 88: 298–309.

Cummings, Ronald G., and Laura O. Taylor. 1999. "Unbiased Value Estimates for Environmental Goods: A Cheap Talk Design for the Contingent Valuation Method." *American Economic Review* 89 (3): 649–65.

De Oliveira, Angela C. M., Rachel T. A. Croson, and Catherine Eckel. 2011. "The Giving Type: Identifying Donors." *Journal of Public Economics* 95 (5): 428–35.

Diamond, Peter A., and Jerry A. Hausman. 1994. "Contingent Valuation: Is Some Number Better Than No Number?" *Journal of Economic Perspectives* 8 (4): 45–64.

Fischbacher, Urs, and Simon Gächter. 2010. "Social Preferences, Beliefs, and the Dynamics of Free Riding in Public Goods Experiments." *American Economic Review* 100 (1): 541–56.

Fischbacher, Urs, Simon Gächter, and Ernst Fehr. 2001. "Are People Conditionally Cooperative? Evidence from a Public Goods Experiment." *Economics Letters* 71 (3): 397–404.

Frey, Bruno S., and Stephan Meier. 2004. "Social Comparisons and Pro-social Behavior: Testing 'Conditional Cooperation' in a Field Experiment." *American Economic Review* 94 (5): 1717–22.

Frey, Bruno S., and Felix Oberholzer-Gee. 1997. "The Cost of Price Incentives: An Empirical Analysis of Motivation Crowding-out." *American Economic Review* 87 (4): 746–55.

Gächter, Simon, and Elke Renner. 2010. "The Effects of (Incentivized) Belief Elicitation in Public Goods Experiments." *Experimental Economics* 13 (3): 364–77.

Hanley, Nick, Felix Schläpfer, and James Spurgeon. 2003. "Aggregating the Benefits of Environmental Improvements: Distance-Decay Functions for Use and Non-use Values." *Journal of Environmental Management* 68 (3): 297–304.

Harrison, Glenn W., and E. Elisabet Rutström. 2008. "Experimental Evidence on the Existence of Hypothetical Bias in Value Elicitation Methods." *Handbook of Experimental Economics Results* 1: 752–67.

Hausman, Jerry. 2012. "Contingent Valuation: From Dubious to Hopeless." *Journal of Economic Perspectives* 26 (4): 43–56.

Heckman, James J. 1979. "Sample Selection Bias as a Specification Error." *Econometrica* 153–61.

Holmes, Thomas P., and Kevin J. Boyle. 2005. "Dynamic Learning and Context-Dependence in Sequential, Attribute-Based, Stated-Preference Valuation Questions." *Land Economics* 81(1): 114–26.

Howard, Gregory, Brian E. Roe, Erik C. Nisbet, and Jay F. Martin. 2017. "Hypothetical Bias Mitigation Techniques in Choice Experiments: Do Cheap Talk and Honesty Priming Effects Fade with Repeated Choices?" *Journal of the Association of Environmental and Resource Economists* 4(2): 543–73.

Johnston, Robert J., Kevin J. Boyle, Wiktor Adamowicz, Jeff Bennett, Roy Brouwer, Trudy Ann Cameron, W. Michael Hanemann, Nick Hanley, Mandy Ryan, Riccardo Scarpa, et al. 2017. "Contemporary Guidance for Stated Preference Studies." *Journal of the Association of Environmental and Resource Economists* 4 (2): 319–405.

Kahneman, Daniel, and Jack L. Knetsch.1992. "Valuing Public Goods: The Purchase of Moral Satisfaction." *Journal of Environmental Economics and Management* 22 (1): 57–70.

Kettl, Donald F. 2000. "The Transformation of Governance: Globalization, Devolution, and the Role of Government." *Public Administration Review* 60 (6): 488–97.

Kling, Catherine L., Danial J. Phaneuf, and Jinhua Zhao. 2012. "From Exxon to BP: Has Some Number Become Better Than No Number?" *Journal of Economic Perspectives* 26 (4): 3–26.

Koetse, M. J., and J. A. Bouma. 2017. "Social Anchoring in Donating to a Public Environmental Good." Paper presented at the EAERE 2017 Conference, Athens, Greece, June 28–July 1, 2017.

Koetse, M. J., and Roy Brouwer. 2016. "Reference Dependence Effects on WTA and WTP Value Functions and Their Disparity." *Environmental and Resource Economics* 65 (4): 723–45.

Kotchen, Matthew J. 2015. "Reconsidering Donations for Nonmarket Valuation." *Environmental and Resource Economics* 62 (3): 481–90.

Kotchen, Matthew J., and Stephen D. Reiling. 2000. "Environmental Attitudes, Motivations, and Contingent Valuation of Nonuse Values: A Case Study Involving Endangered Species." *Ecological Economics* 32 (1): 93–107.

List, John A. 2001. "Do Explicit Warnings Eliminate the Hypothetical Bias in Elicitation Procedures? Evidence from Field Auctions for Sportscards." *American Economic Review* 91 (5): 1498–7.

List, John A., and Craig A. Gallet. 2001. "What Experimental Protocol Influence Disparities between Actual and Hypothetical Stated Values?" *Environmental and Resource Economics* 20 (3): 241–54.

Loomis, John. 2011. "What's to Know about Hypothetical Bias in Stated Preference Valuation Studies?" *Journal of Economic Surveys* 25 (2): 363–70.

Milfont, Taciano L., and John Duckitt. 2010. "The Environmental Attitudes Inventory: A Valid and Reliable Measure to Assess the Structure of Environmental Attitudes." *Journal of Environmental Psychology* 30 (1): 80–94.

Moser, Riccarda, Roberta Raffaelli, and Sandra Notaro. 2013. "Testing Hypothetical Bias with a Real Choice Experiment Using Respondents' Own Money." *European Review of Agricultural Economics* 41 (1): 1–22.

Mullainathan, Sendhil, and Richard H. Thaler. 2000. "Behavioral Economics." Working Paper w7948. Cambridge, MA: National Bureau of Economic Research.

Murphy, James J., P. Geoffrey Allen, Thomas H. Stevens, and Darryl Weatherhead. 2005. "A Meta-analysis of Hypothetical Bias in Stated Preference Valuation." *Environmental and Resource Economics* 30 (3): 313–25.

Nyborg, Karine, and Mari Rege. 2003. "Does Public Policy Crowd Out Private Contributions to Public Goods." *Public Choice* 115 (3): 397–418.

PBL (Netherlands Environmental Assessment Agency). 2011. *Greening the Common Agricultural Policy: Impacts on Farmland Biodiversity on an EU Scale.* The Hague: PBL/Netherlands Environmental Assessment Agency.

Poe, Gregory L., Jeremy E. Clark, Daniel Rondeau, and William D. Schulze. 2002. "Provision Point Mechanisms and Field Validity Tests of Contingent Valuation." *Environmental and Resource Economics* 23 (1): 105–31.

Poe, Gregory L., Kelly L. Giraud, and John B. Loomis. 2005. "Computational Methods for Measuring the Difference of Empirical Distributions." *American Journal of Agricultural Economics* 87 (2): 353–65.

Rode, Julian, Erik Gómez-Baggethun, and Torsten Krause. 2015. "Motivation Crowding by Economic Incentives in Conservation Policy: A Review of the Empirical Evidence." *Ecological Economics* 117: 270–82.

Samuelson, Paul A. 1954. "The Pure Theory of Public Expenditure." *Review of Economics and Statistics* 36 (4): 387–89.

Schkade, David A., and John W. Payne. 1994. "How People Respond to Contingent Valuation Questions: A Verbal Protocol Analysis of Willingness to Pay for an Environmental Regulation." *Journal of Environmental Economics and Management* 26 (1): 88–109.

Schläpfer, Felix, and Baruch Fischhoff. 2012. "Task Familiarity and Contextual Cues Predict Hypothetical Bias in a Meta-analysis of Stated Preference Studies." *Ecological Economics* 81: 44–47.

Seip, Kalle, and Jon Strand. 1992. "Willingness to Pay for Environmental Goods in Norway: A Contingent Valuation Study with Real Payment." *Environmental and Resource Economics* 2 (1): 91–106.

Smith, Alexander. 2013."Estimating the Causal Effect of Beliefs on Contributions in Repeated

Public Good Games." *Experimental Economics* 16 (3): 414–25.

Spash, Clive L. 2006. "Non-economic Motivation for Contingent Values: Rights and Attitudinal Beliefs in the Willingness to Pay for Environmental Improvements." *Land Economics* 82 (4): 602–22.

———. 2008. "Deliberative Monetary Valuation and the Evidence for a New Value Theory." *Land Economics* 84 (3): 469–88.

Stortelder, Anton H. F., and Michel A. Kiers. 2011. *Boeren voor Natuur, waar kan dit concept met succes worden ingevoerd?* Alterra Report 2145. Wageningen, Netherlands: Alterra.

Turner, R. Kerry, David W. Pearce, and Ian Bateman. 1994. *Environmental Economics: An Elementary Introduction*. London: Harvester Wheatsheaf.

Tyler, Tom R. 2006. "Psychological Perspectives on Legitimacy and Legitimation." *Annual Review of Psychology* 57: 375–400.

Vossler, Christian A., Maurice Doyon, and Daniel Rondeau. 2012. "Truth in Consequentiality: Theory and Field Evidence on Discrete Choice Experiments." *American Economic Journal: Microeconomics* 4 (4): 145–71.

Westerink, J., A. H. F. Stortelder, F.G.W.A. Ottburg, T. A. De Boer, R. A. M. Schrijver, C. K. de Vries, M. Plomp, E. A. A. Smolders, A. T. W. Eysink, and G. H. Bulten. 2013. *Boeren voor Natuur; Hoe werkt het en wat levert het op?* Alterra Report 2472. Wageningen, Netherlands: Alterra.